

Accelerator Systems Division Highlights for the Week Ending August 31, 2001

ASD/LBNL: Front End Systems

The unexplained metallic coating on the second CP antenna continues to grow during operation; the antenna now has sustained 8 hrs of 6% duty-factor operation and still functions well, in spite of this layer.

The Blue-Box makeover is in its last phase: pulling cables. High-potential tests planned to start next week. The LEBT has been serviced and is installed again in its tank at the Integrated Testing Facility.

RFQ Module #4 has reached full nominal rf power at 100 microseconds, 15 Hz; the conditioning is progressing well. Power-coupler window conditioning has been postponed in favor of this RFQ conditioning.

We submitted a PCR for the Diagnostic Beamline needed to characterize RFQ and MEBT beams at Berkeley and the MEBT beam at Oak Ridge.

We have received confirmation from BNL that their Diagnostics Group will deliver to the Front-End Systems the complete mechanical systems for 5 wire scanners, and from LANL that they will deliver the electronics for wire scanners and beam-position monitors.

The FES were being visited by Paul Gibson of the SNS Ion Source Group for one week and by Martin Stockli on 8/30-31.

FES staff is involved in organizing the International Conference on Ion Sources, ICIS '01, next week in Oakland, CA. 5 papers were submitted by FES staff or a collaboration of SNS-IS and FES staff on SNS-related ion-source topics.

ASD/LANL: Warm Linac

The CCL hot model ran again for an extra day and a half. The SNS prototype high-voltage converter modulator powered the 2.5-MW, 805-kW klystron, resulting in hot model operation in steady state, under resonance control at up to 148% of full average power for the highest field gradient. This corresponded to 605 kW peak power, 1.2 ms pulse width, and 60 Hz repetition rate. Stable operation was always observed. Stop band measurements continued to be excellent; there was little difference in the two nearest modes to the $\pi/2$ mode with values scaled from low-power measurements during cavity tuning. LANL is appreciative of our JLab visitors for completing their RF power coupler tests and leaving us the last 12 hours of their allocated time, thereby enabling the hot model reprise. (WBS 1.1.4)

The CCL FDR was held. In their closeout, the committee remarked that the design team did an excellent job, that the design criteria were met, that previous PDR issues were thoroughly and satisfactorily resolved, and that the right set of analyses and tests were performed to support fabrication. No showstoppers were found and the committee recommended that we may confidently move ahead with the RF structure procurement. (WBS 1.4.4)

The current round of JLab power coupler testing was completed. The LANL RF system was powered by the BMEWS power supply with 805-kHz RF pulsed outputs of up to 1 MW at 30 Hz. (WBS 1.4.1.1)

Significant progress was achieved in diagnosing and repairing the SCR failures on the capacitor charging supply for SNS prototype high-voltage converter modulator (HVCN). The vendor (NWL) promptly came to LANL and worked side-by-side all week with LANL personnel. One manufacturing error and two design limitations were identified and corrected. The principal cause for the recent failures was linked to improper wiring of the SCR gate phasing; the faults were further compounded by undersized snubbers and also by extraneous gate pulses induced from startup breaker switching noise. The NWL-LANL team corrected the wiring, installed larger snubbers, and installed a timer relay for the gate pulser. We are now back in operation to support the full-average power testing of the CCL hot model. During the hot model tests, the HVCN ran at 0.25-MW average power for several hours without a single fault. (WBS 1.4.1.2)

We have re-evaluated the HVCM Procurement Package and re-opened bidding to include additional drawings that will clarify the 80-kV system. (WBS 1.4.1.2)

The drift tube manifolds and drift tube mounts are nearly complete. This week Coronado received the material for the drift tube stems. They are planning to begin prototyping the fit between the stem and the drift tube mount. Recall, that the fit between the stem and mount was modified in response to recommendations by the DTL FDR Committee. The prototype EMD drift tube was successfully hi potted to 900 V this week. (WBS 1.4.2)

The GlidCop® material arrived at LANL this week and was immediately shipped to Coronado, where they will begin fabricating the DTL drive iris. The DTL tank fabrication is running slightly behind schedule. We are aggressively working on the schedule and are still planning to begin assembly of the DTL this fall. Miscellaneous procurements such as a prototype tank for plating and plating hardware are currently out for fabrication.

We awarded the contract for the DTL post couplers. (WBS 1.4.2)

The assembly drawings for the DTL water system are currently in checking and we are now working on the drawings for Tanks 4-6. (WBS 1.4.2)

Work on the ETC exercise was completed. Information was sent to ORNL. (WBS 1.4.6)

We submitted 26 Advanced Procurement Plans (APPs) for FY02 to the SNS/ORNL Project Office in support of their new draft performance metrics. The total estimate value of the APP's is \$24,309K.

We re-submitted a priority list of sponge contracts to the SNS/ORNL Business Manager for possible funding availability in September. (WBS 1.4.6)

We completed the Change of Station Package for Eric Bjorklund who will begin working in ORNL on Sept. 4 under WBS 1.9. This will bring the total number of LANL employees relocated at SNS to four. At least two more change-of-station assignments are also planned. (WBS 1.9)

ASD/JLAB: Cold Linac

The fourth refrigerator field installation coordination meeting with SNS staff has been scheduled for September 13. Design of the field installation package continues.

Fabrication of remaining transfer line components continues.

Further analysis has revealed that the location of the stiffening ring on the medium- β cavities, determined by assuming perfectly rigid ends, is considerably in error when the effects of the real mounting system are considered. Considerable reduction in the Lorentz detuning coefficient could be achieved by relocating the stiffening ring.

In addition, analysis of the dynamic detuning effect is showing that this effect could be reduced if the cavity were made less stiff.

Initial investigations of the availability of piezoelectric elements and drivers suitable for a fast tuner have been encouraging. A conceptual design for implementation of such a tuner is being evaluated.

Fundamental Power Coupler Testing at LANL proceeded well. Peak transmitted power reached levels in excess of 720 kW.

A second internal design review of the prototype cryomodule HOM cable design was held. We are ready to begin procurement of the needed cables.

The first shipment of niobium for high- β cavities has been received.

Work continues on design changes to the helium vessel and tuner to accommodate dimensional variances observed in the prototype cavities.

Installation of infrastructure support for the RF test stand continues.

ASD/BNL: Ring

Estimate to Completion (ETC) continued on all WBS 1.5 Ring and Transport Systems.

Year-end planning for FY01/02 closeout and transition, including a review of APPs and phase funded procurements for the first quarter of FY02.

Preparations are underway for the upcoming ASAC Review in September.

Bill Foyt was at BNL this week for Earned Value Verification and Financial Management Audit.

BNL Shops are currently working on the fabrication of the HEBT dipole magnet stands.

Low Field Power Supplies: 1st article tests are planned for early December.

Medium Field Power Supplies: Bid closing for the Medium Range Power Supplies is at the end of business today (8/31/01). We currently have five packages in, and it's likely these are the five packages we'll have at the end of the day. They are: Alpha Scientific, Bruker, Danfysik, Dynapower, and IE Power. Bids will be opened on Wednesday, Sept. 5th. ASD has been advised.

Injection kicker power supplies – acceptance testing has been scheduled for September 11 – 14 for 1st article.

Assembly efforts continue on the RF cavity and PA (#1). Alex Zaltsman is aiming to test in September.

Apogee Labs has delivered their first production lot of power supply interface controllers (PSI). Some of these will be used to test the Danfysik Low Field PS in December. The first lot consists of 35 units.

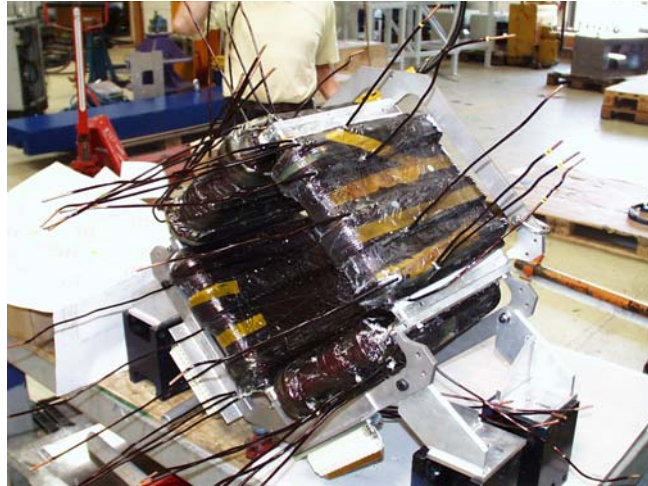
Contracts for the Ring dipole cores and coils are nearly complete. The last cores have been delivered by Allied Engineering.

Design of the collimator outer shield is underway.

To date, seventeen (17) production Ring dipole magnets have been assembled and surveyed. Field quality measurements of these production magnets will begin in late September.

Work continues to install a laser wire scanner into the Linac-to-AGS transfer line for additional real time testing.

The 27CDM30 (prototype) has been received from Danfysik and is being prepared for testing.



27CDM30 – Prototype



Test Chamber for Extraction Kicker Magnet



PSI Module from Apogee Labs – Production Unit

Controls:

At LBNL work continued with the vendor to improve the Group 3 driver, at the same time as the front end reconfiguration was supported. Interface construction for the full RFQ cooling and vacuum systems proceeded.

LANL assisted with the EPICS Database installation at ORNL. A start was made on the implementation of the EPICS Database and screens for the HPRF system, based upon an 8/20/01 signal list and panel view description. Work proceeded to the verification and documentation phase of a project to add prioritized dispatching to the EPICS communication protocol – “Channel Access.”

BNL received 35 Power Supply Interface cards – the remainder is expected in the next two weeks. The power supply application is now being moved to the SNS-standard Linux environment. The latest drivers for the timing system hardware were published on the WEB.

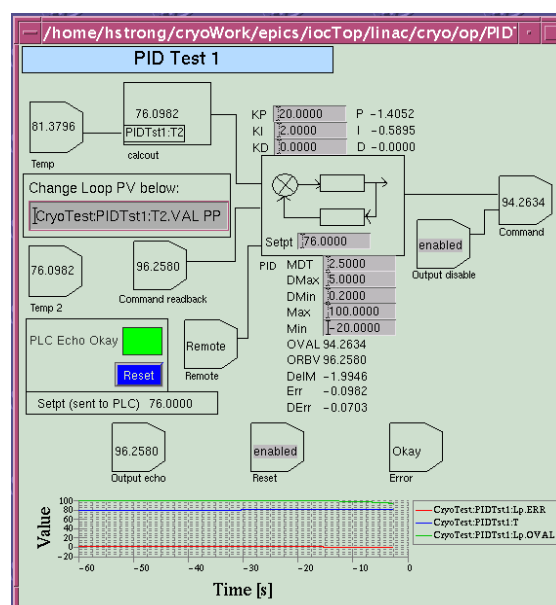
The Target Utilities I&C design has been completed and is now in QA review at Sverdrup Tullahoma. In addition to the instrument specification, this package includes design of the PLC cabinets, specifications for the PLCs and other components that are located in the PLCs, and wiring diagrams of the instruments and PLCs. This package will be reviewed as part of the Target Utilities 75% review on September 21.

An improved construction contracting method for installation of the site communications backbone (which is mostly global controls fiber optics cabling) was agreed upon and set in motion. The design for this backbone will be completed by Sverdrup Tullahoma and installed by the site I&C Installation Contractor. This puts all controls and communications cabling under the oversight of the controls team.

A trip to Sverdrup Tullahoma was made to evaluate progress on Title II design drawings and the EPICS setup for production software. Work is on schedule and its quality is very good.

The PLC components for the Cryogenic Gas Management system were ordered and several have arrived.

The cryo plant must run nearly 100% of the time. Most of the control loops must be operational for the plant to run. If the primary sensor for the process variable for a control loop fails, the control loop will not function properly. The EPICS and PLC-based control system must provide a means for the operator to select an alternate sensor to use as the process variable for the control loop. The ability to dynamically change the process variable for a PID control loop was implemented and demonstrated on the cryo controls development system. An operator interface to implement such a change is illustrated below.



ASD/ORNL: Integration

Acceptance criteria for most of the accelerator have been drafted. Partner Lab personnel have already reviewed much of it; the remaining criteria will be distributed next week.

A transmittal was issued requesting a cost estimate for extending the tunnel over DTL tanks 1 & 2.

Installation Support

Air piping to group areas is now complete and operational. Received 5-circulators for the 402.5 MHz klystrons. Waveguide components continue to arrive at RATS almost daily. Pulled phone/data cable to group area as needed. Continue to work on water & power in the power supply test area.

All the water and air piping has been received and will be installed in the linac mock-up next week.

Most of the installation estimates are now complete and are being inputted into the ASD installation schedule. Work continues on the RATS work estimate and component delivery dates for input into the schedule.

Accelerator Physics

E. Tanke visited LANL to participate in the CCL Final Design Review, and also to work on linac commissioning plans.

Two technical notes were released. D. Jeon et.al. wrote a note on MEBT quad matching techniques using the DTL emittance measurement. S. Kim et. al. wrote a comprehensive report on the SRF HOM studies.

The experimental beam studies at PSR that J. Holmes and S. Cousineau participated in provided useful data for predicting the extent of halo production, which will be useful for benchmarking the ring beam loss model. This benchmarking with the ORBIT code is underway.

Operations

Ion Source Group

RF Group

Cryo Transfer Line Group

We have completed all the 40-foot sections of supply and return transfer lines that run from the CHL to the tunnel.

We have set up the tooling to fabricate the 40-foot sections of transfer lines into 80 foot sections and have made the first welds on the 6 inch supply transfer line.

We have set up the tooling necessary to assemble the "Pull ends" onto the supply and return transfer lines and have started the assembly process on the 6 inch supply line.

Mechanical Group

Magnet Measurement Group

The HEBT 8D533 measurement coil has been assembled. Next week we expect to begin system checkout.

Power Supply Group

Survey and Alignment Group

We have been involved in an ongoing interface with CF and the contractor responsible for monument installation, Southern Mechanical Systems, regarding the current phase of monument installation. Three more rod monuments have been installed this week. The balance of the concrete monuments will be installed next week, along with all pads and bollards.

This ongoing process is continually evolving as more components are identified. We further check the position of components (from latest drawings made available) with respect to the physicist's lattice. Currently, we are verifying the cryo structures and warm section.

The Survey & Alignment area of the RATS building is now functional consisting of granite tables, precision metal tables, a laser tracker measuring station, tooling bars, and an instrument calibration area.

Beam Diagnostics Group

LANL beam diagnostics report:

D-plate: Final design work continues. LANL began negotiations with Princeton Scientific for the emittance measurement collectors. We are preparing alignment specifications for the D-plate. We are investigating methods to ensure the D-plate quad will not be set to produce dangerously small spot sizes. Possibilities include an infrared monitor and using the control system to monitor the quad current.

BPMs: Fabrication continues on the DTL BPM pickups. We expect them to arrive at LANL the week of Sep. 10. Bids have been received for the SCL and CCL pickups, but the package will likely have to be re-bid to separate out the prototypes and the production units. The TR pickup drawing package is through checking, and we may include this pickup in the new bid package. We are still waiting for JLab review and signature on the SCL pickup drawings. We are finishing up the characterization of the Kapton cables we plan to use for the in-stem cabling for the DTL pickups. We are working on the LabVIEW programming for the PCI motherboard. We plan to have a mini final design review for just the DTL pickups in mid-September.

WS: Revisions to the signal processor PCB are in progress. We have estimated the cost if the project chooses to have LANL deliver WS electronics for the MEBT. We have estimated the cost if the project chooses to have LANL deliver the HEBT, ring, and RTBT wire scanner actuators. We modified the fork design to offset the wires so that only one wire at a time is within a 2-sigma radius of the beam center.

ORNL-SNS beam diagnostics report:

Dave spent time renaming the diagnostic devices and populated the Oracle database with the latest device layout as LANL ideograms. He is trying to resolve the issues associated with SCL naming conventions. Dave is also updating the EDM displays with the new widgets provided by John Sinclair. There was a Computer Based Machine Vision Solution seminar sponsored by National Instrument in town and Dave Purcell attended that. Craig went to the CCL hot model review. He continues his efforts with the details of the Fast Faraday cup design, specifically how to treat the dc bias of the cup and a high frequency non-reflective attenuation issues. Tom went to Maryland on Monday and Tuesday. Saeed was away for the week.